TII:

RC Coupled Amplifiers

Unclassified

2 Hour Conference, W/ 3Hr PE1

Safety & Environmental Impact is "LOW"

TII: RC Coupled Amplifiers

Terminal Learning Objective

Action: Given a schematic diagram, answer all questions pertinent to the operation & Ckt characteristics, of an RC Coupled Amplifier, and the concepts of Coupling, Impedance Matching, Bandwidth & System Gain that are presented in this lesson.

Condition: W/White OMEMS Training Aid.

Standard: Minimum of 70%

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Reason & Tie In

This lesson is a continuation of the previous lessons in TI, emphasis is placed on staging amplifiers, an additional concepts thus further refine what you have learned as well as introduce new concepts to deepen your under standing of transistorized Ckt.

System Gain

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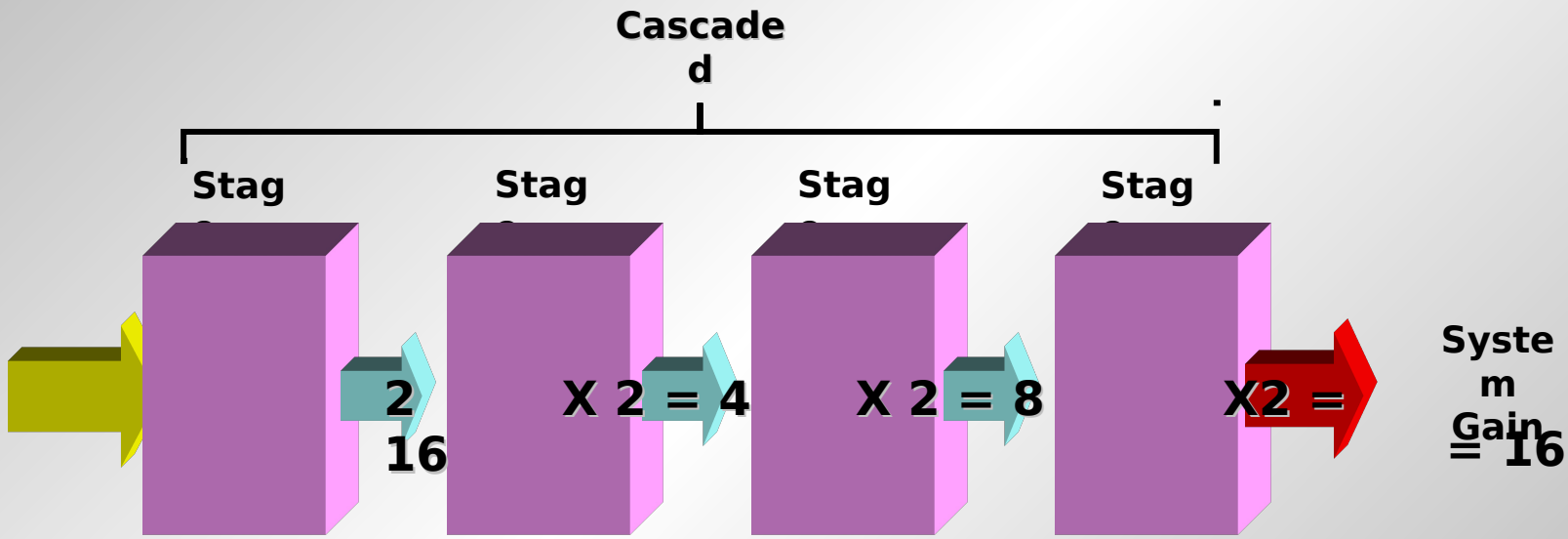
System Gain; Individual Gain X the Gain of the next …,.



Note: individual gains are set low to prevent signal distortion.

Impedance Matching

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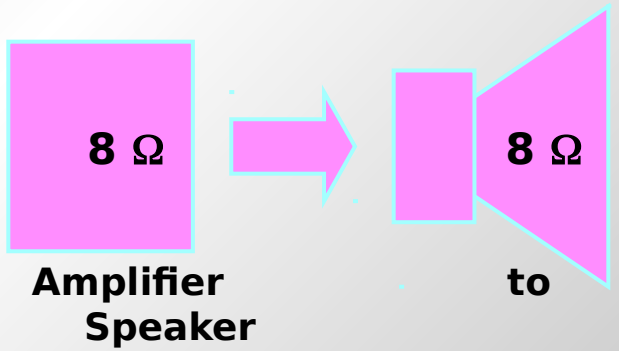
Impedance Matching;

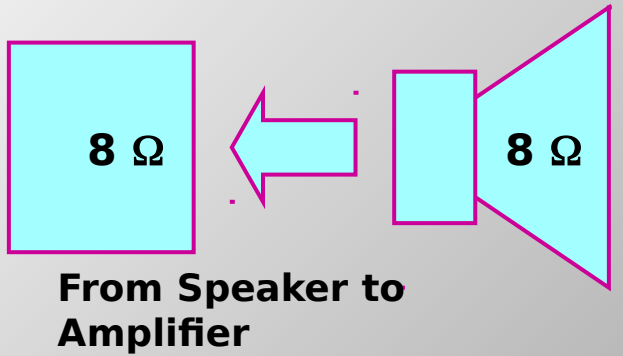
Impedance;

The total opposition to AC of the entire circuit, all components are considered.

Impedance Matching;

Is required for the maximum transfer of power, from one stage to the next. From Input device to output device. From output back to input device, the two must agree for maximum transfer of power.





Transformer Coupling

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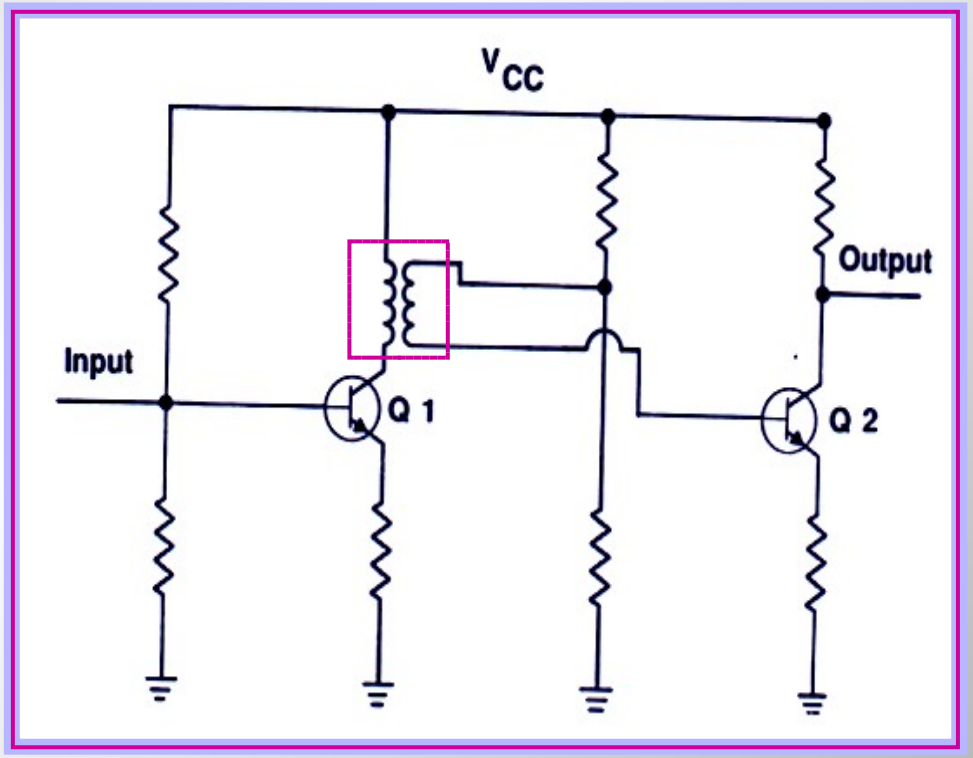
Transformer Coupling;

A Transformer for the purpose of Impedance matching is ideal. One Ckt on the primary & the other on the secondary. The windings can be Increased or decreased as required for a match.



Advantages;

Z Matching the Best

DC Isolation

Disadvantages;

Big & Bulky

Expensive

Poor Frequency response.

RC Coupling

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RC Coupling; The most commonly used type of coupling.

Advantages;

Small in size & cost.

Frequency response is good in mid to high range applications.

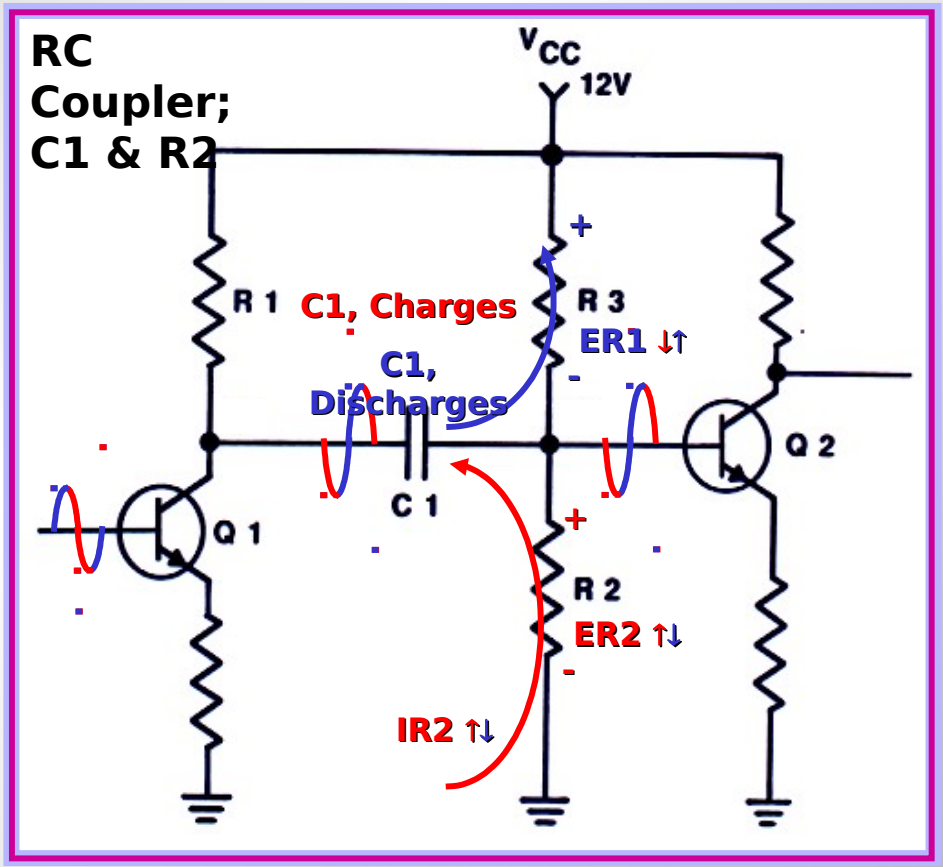
DC isolation.

Disadvantages;

Impedance matching is compromised.

Low frequency applications is limited due to ↑ XC.

60° Phase Shift.



Direct Coupling

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Direct Coupling;

Advantages;

Responds to low frequency applications including DC.

NO Phase Shift.

Simplicity of design.

Low noise.

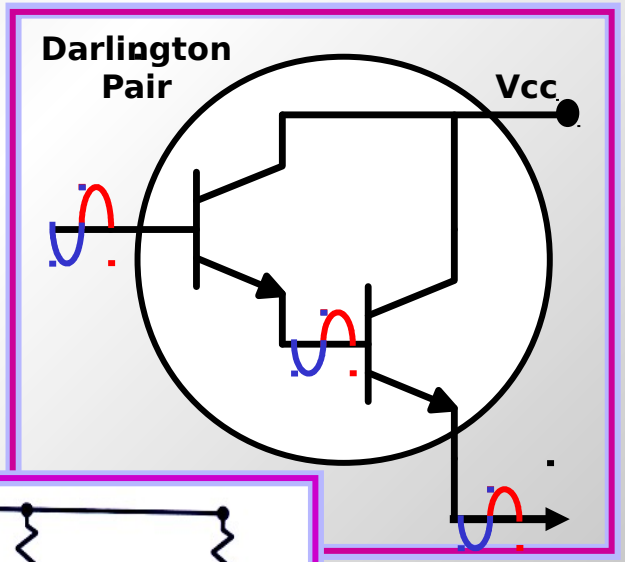
Darlington Pair, Used as a impedance matching devi

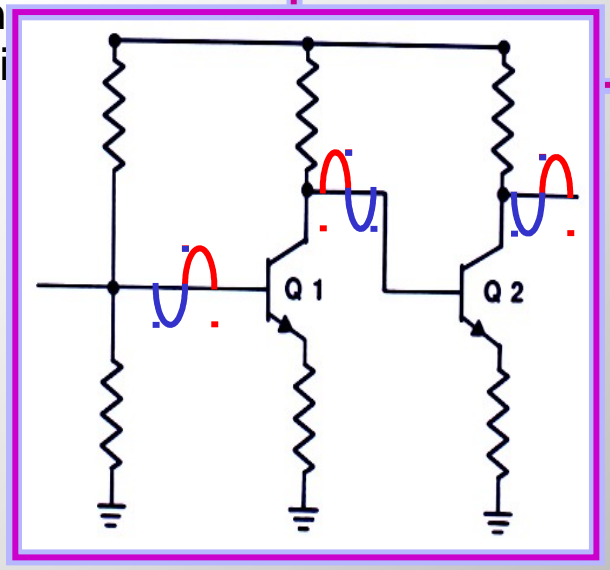
Manufactured in a single packaged unit.

Disadvantages;

Temperature sensitive.

Any drift in the Q point of Q1 is further compounded by Q2.





Bandwidth

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Bandwidth & ½ Power Point; Reference White Gov Tng Aid.

Bandwidth;

The frequencies an amplifier will effectively amplify, or the operational spectrum between the lower [f1] & upper limit [f2] of the ½ Power Points.

BW = f2 – f1

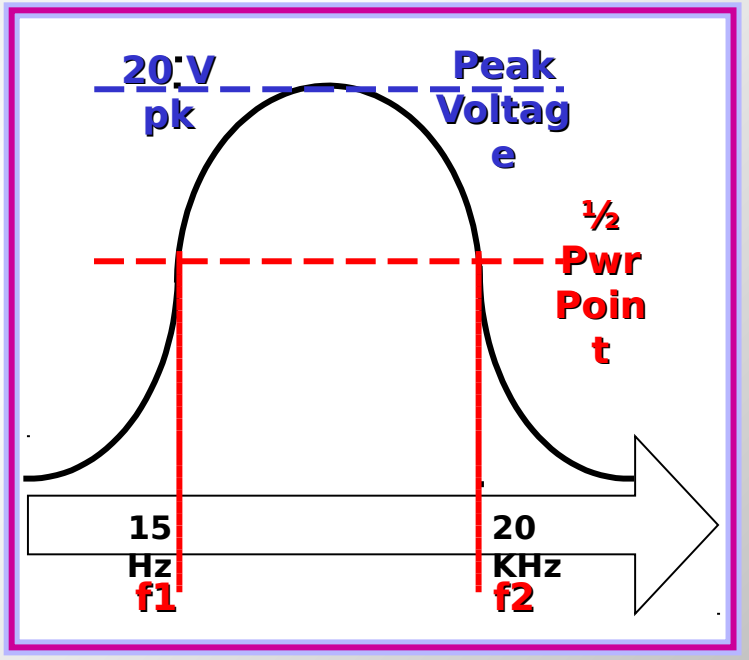
½ Power Point;

The points in the bandwidth where the signal amplitude decreases to 70% of the peak voltage.

½ Pwr pt. = Peak Voltage X .707

f1; Lower frequency limit, Is set by the Coupling & Bypass Caps.

f2; Upper frequency limit, Is set by the Shunt Caps.



f1 = _____

f2 = _____

BW = _____

½ Pwr pt. = _____

T- Shooting

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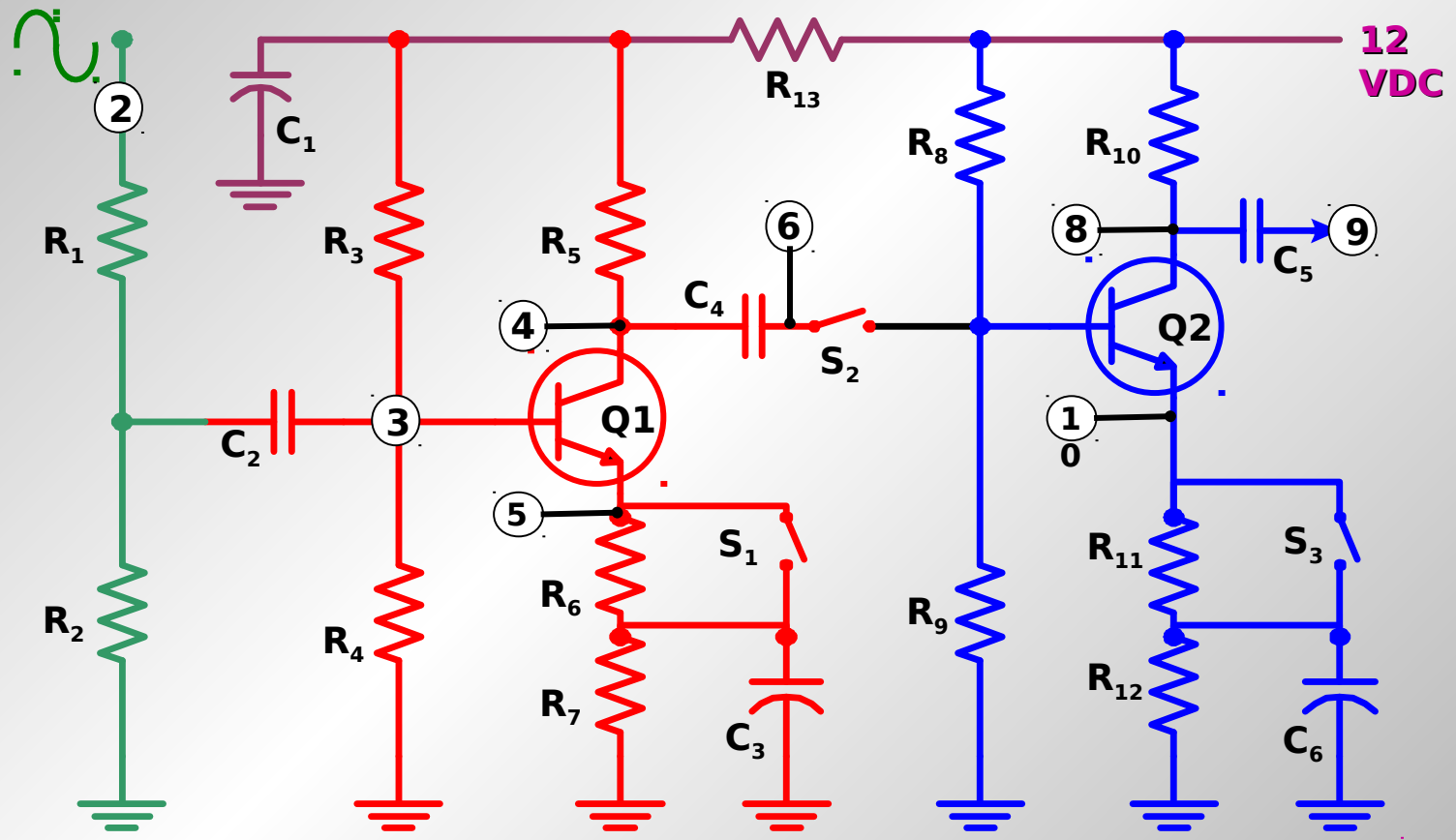
PC 130A-33; 2 Stages.



Component ID

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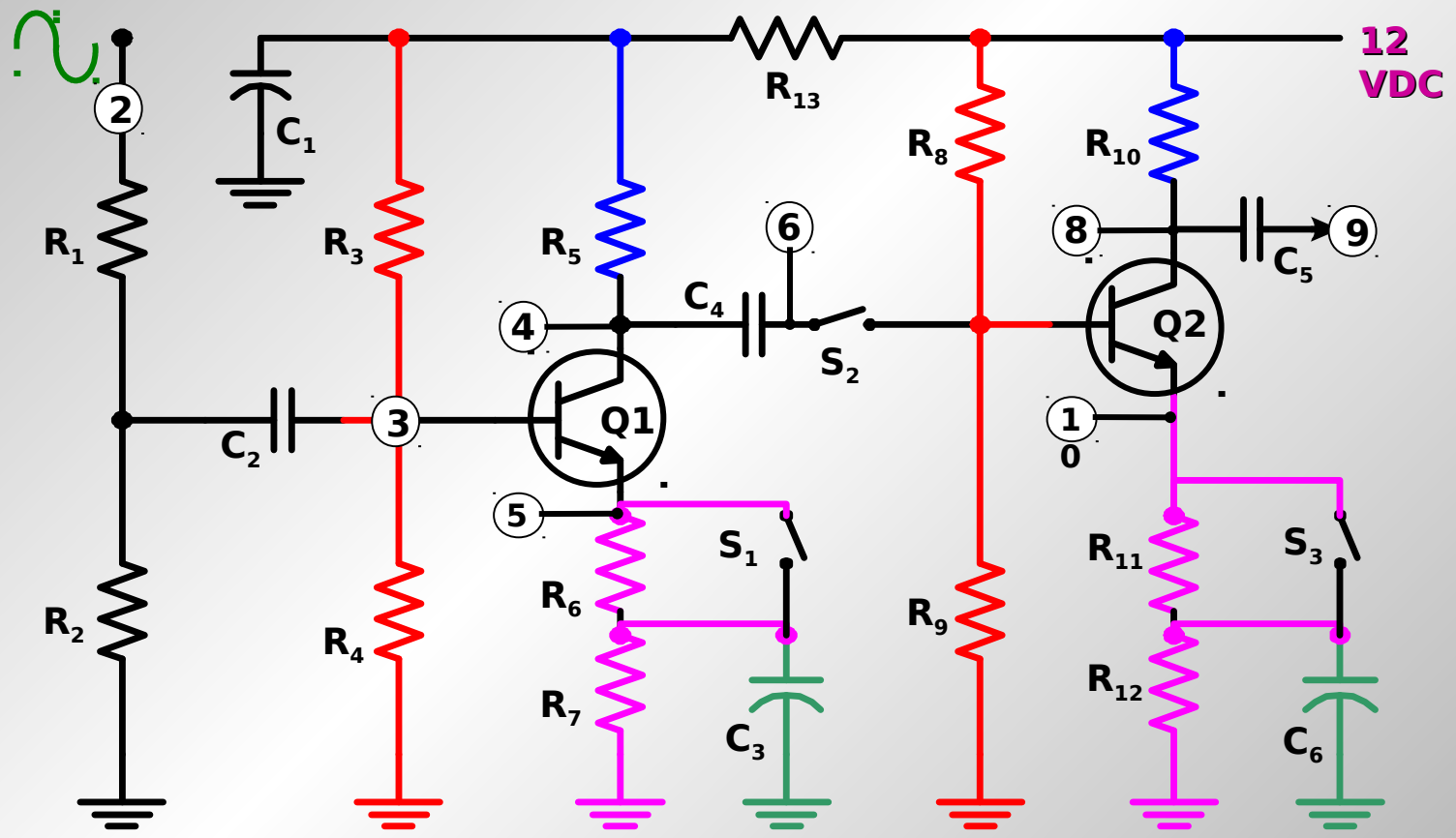
PC 130A-33; Component ID & Function.



Trouble Shooting

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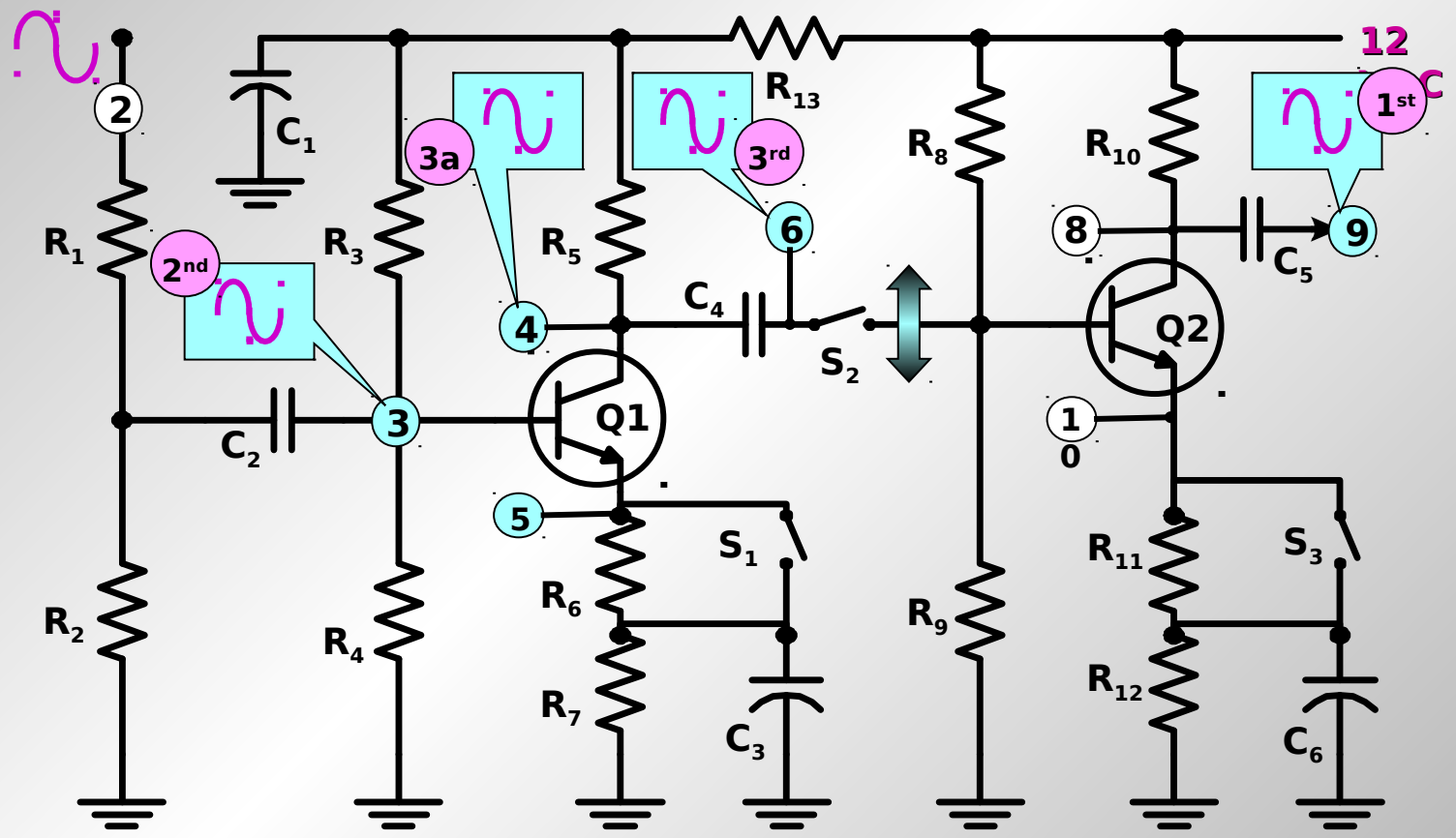
Troubleshooting; Sequence to locate defective Stage.



Challenge 1.

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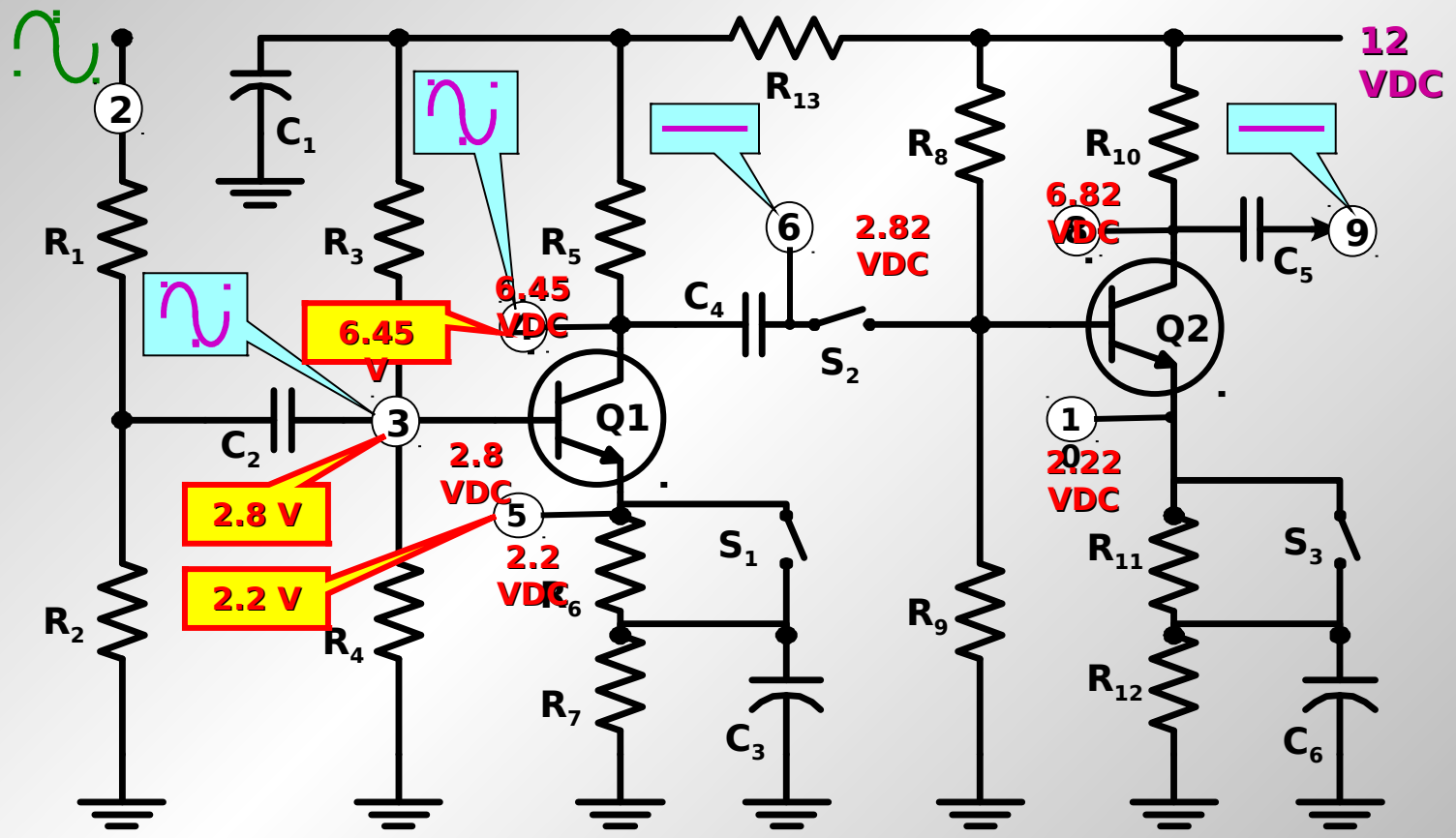
PC 130A-33; Troubleshooting, Challenge 1.



Challenge 2

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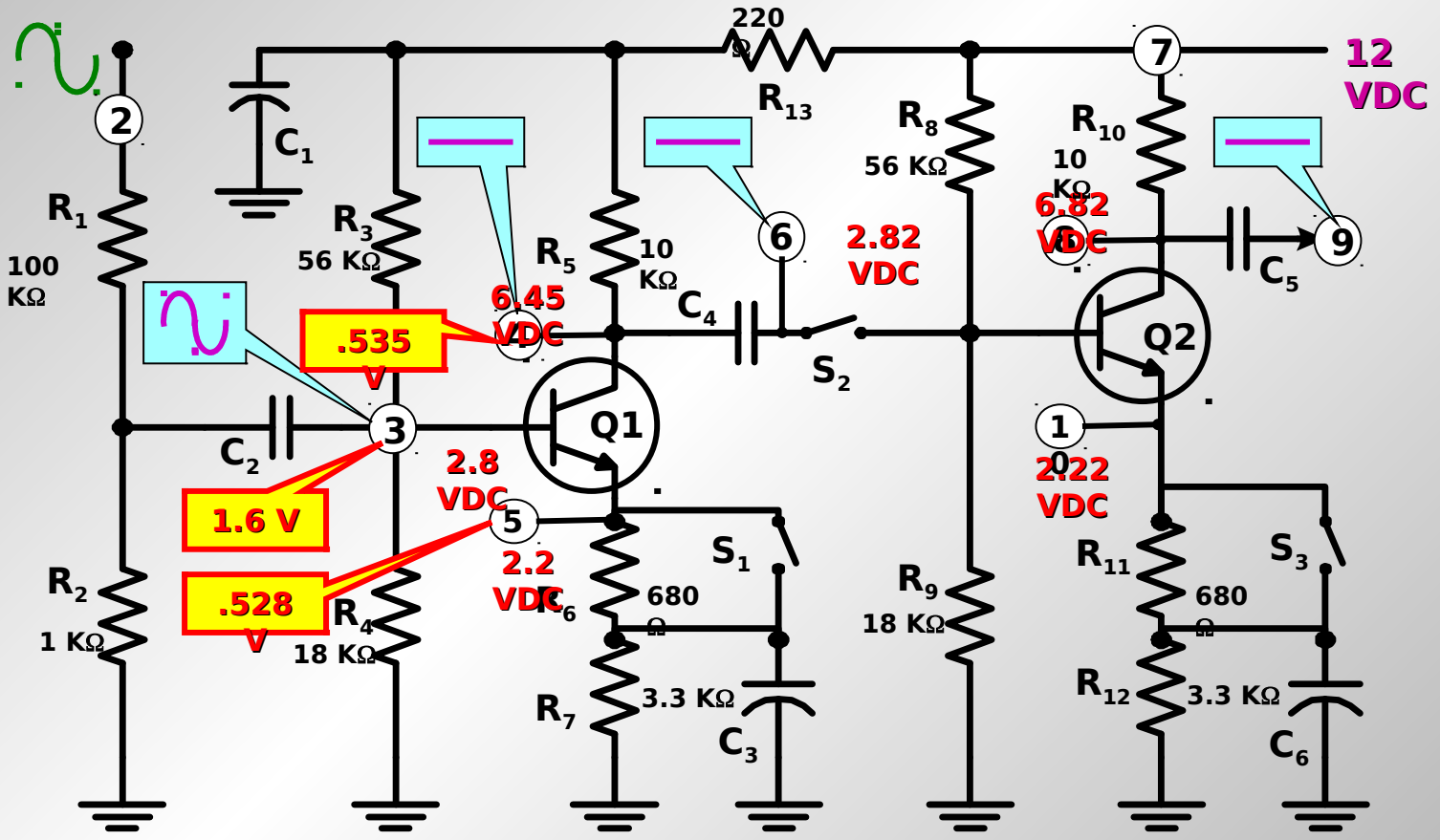
PC 130A-33; Troubleshooting, Challenge 2.



Challenge 3

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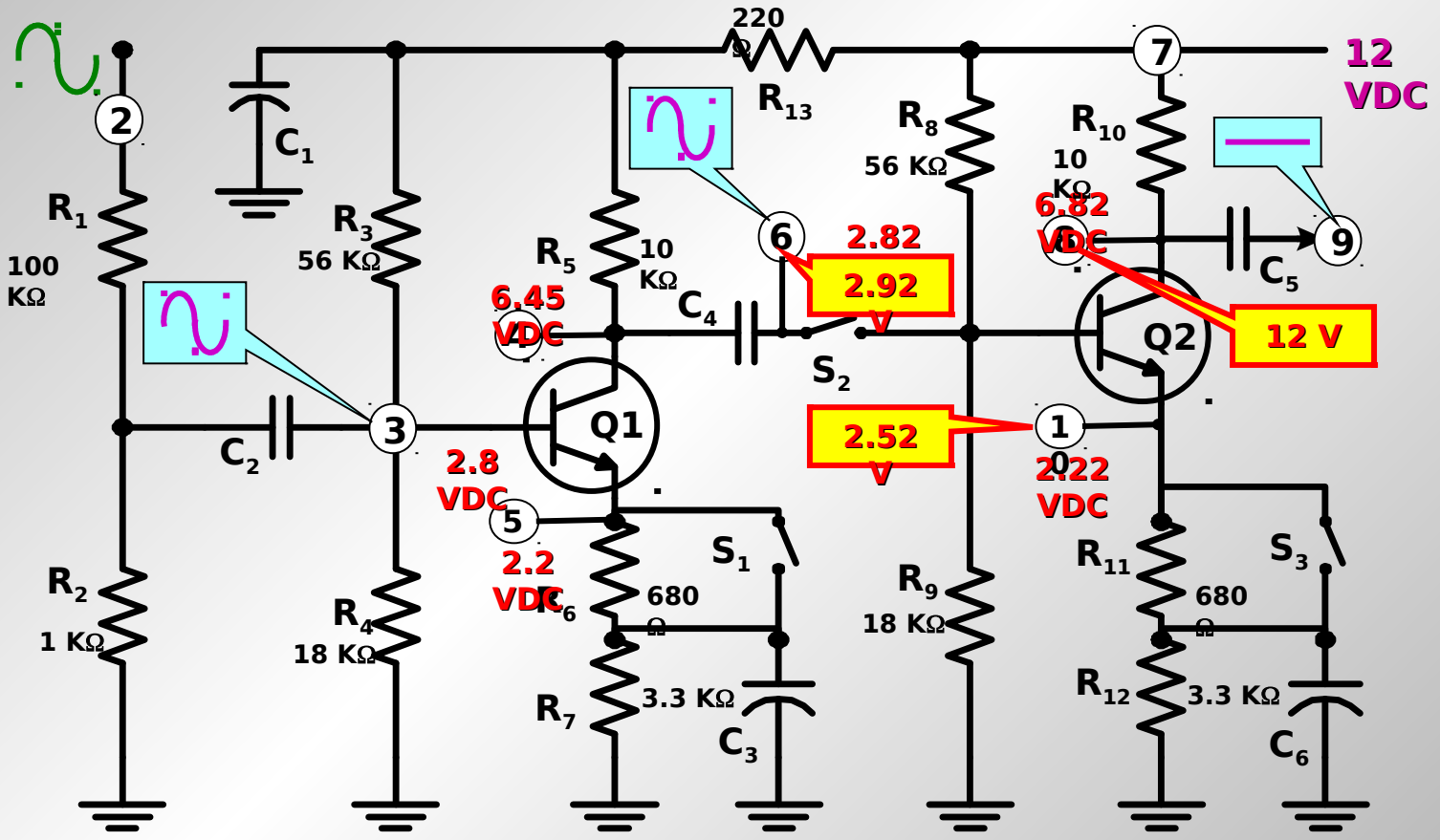
PC 130A-33; Troubleshooting, Challenge 3.



Challenge 4

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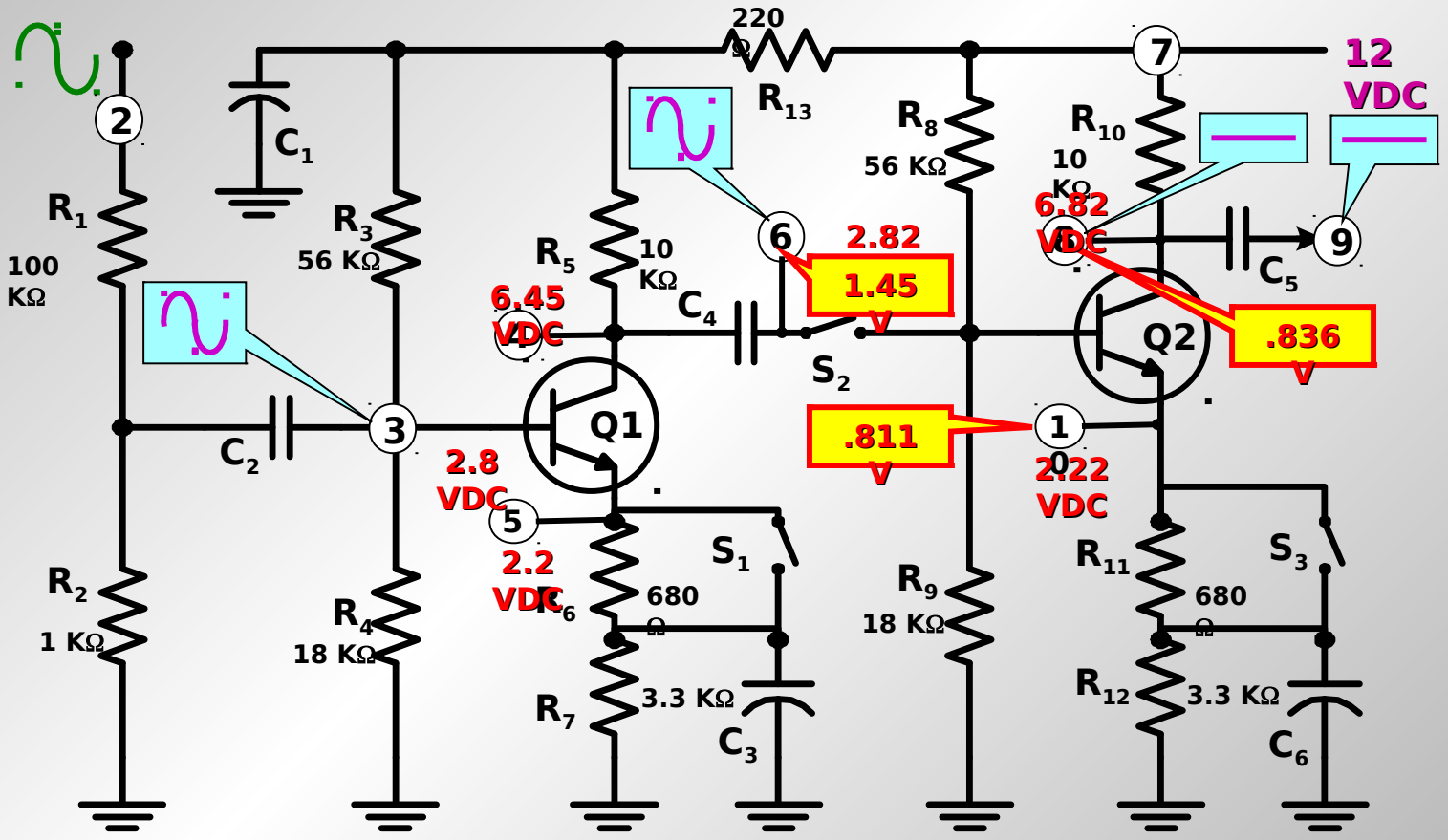
PC 130A-33; Troubleshooting, Challenge 4.



Challenge 5

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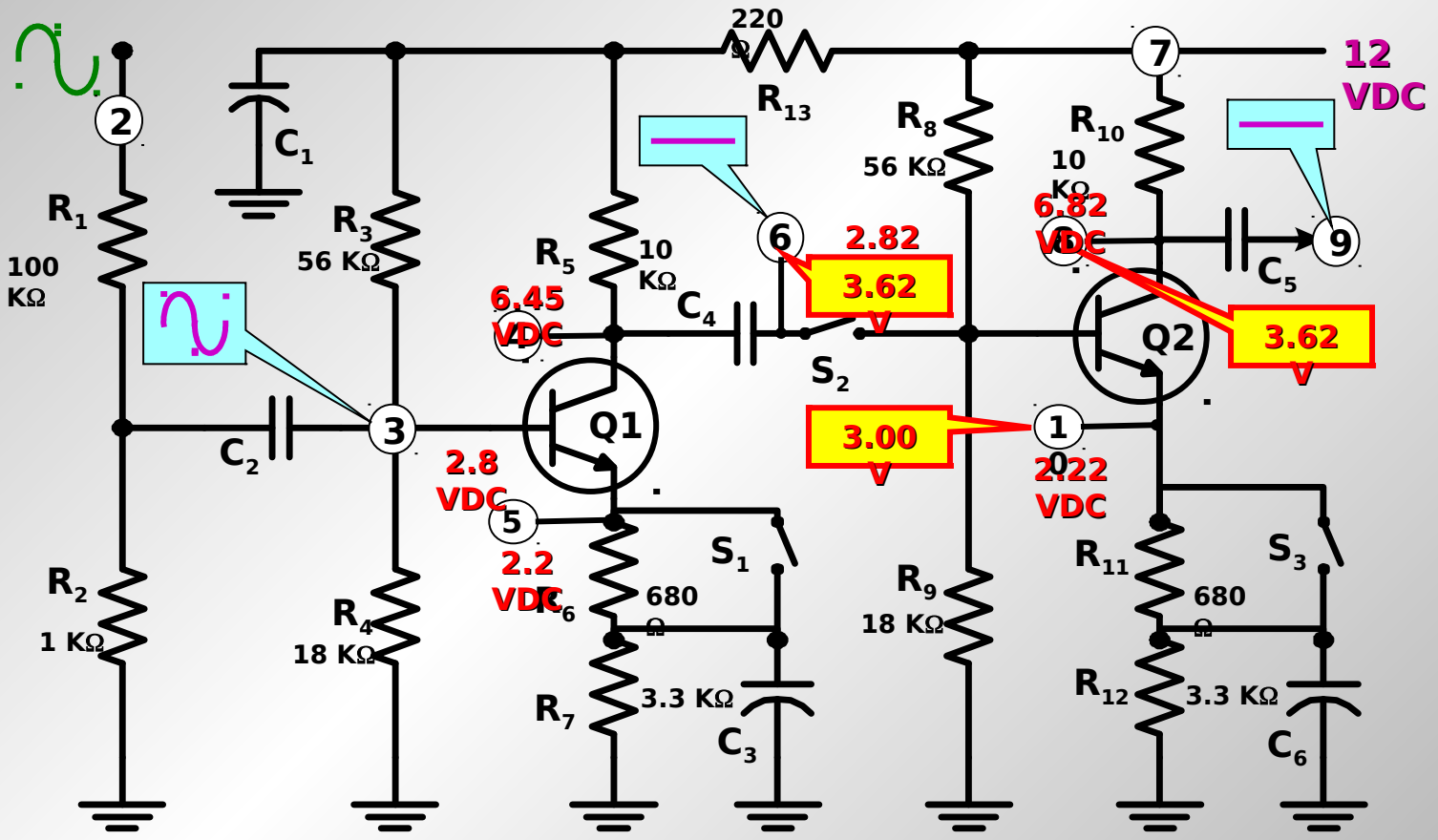
PC 130A-33; Troubleshooting, Challenge 5.



Challenge 6

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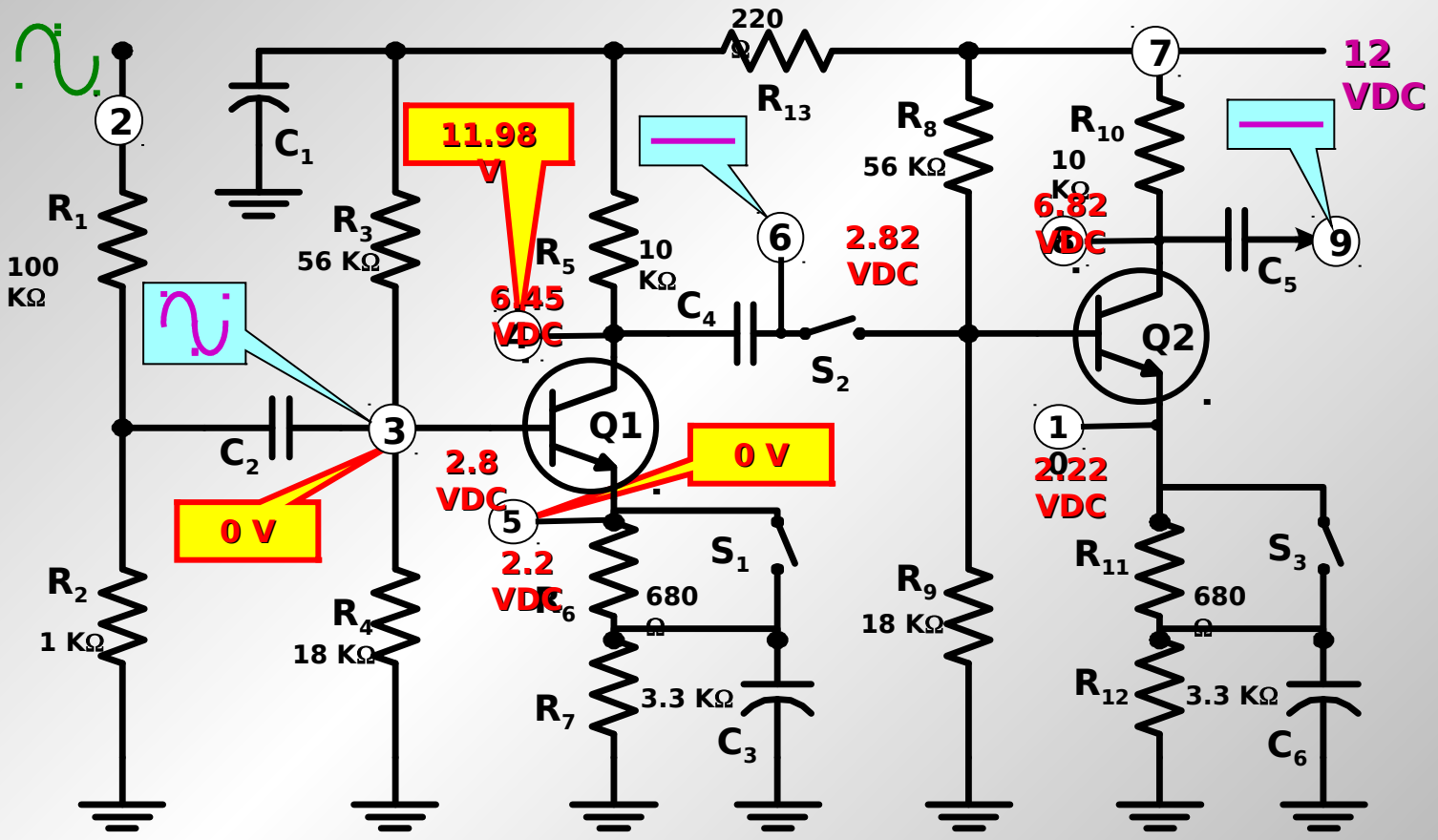
PC 130A-33; Troubleshooting, Challenge 6.



Challenge 7

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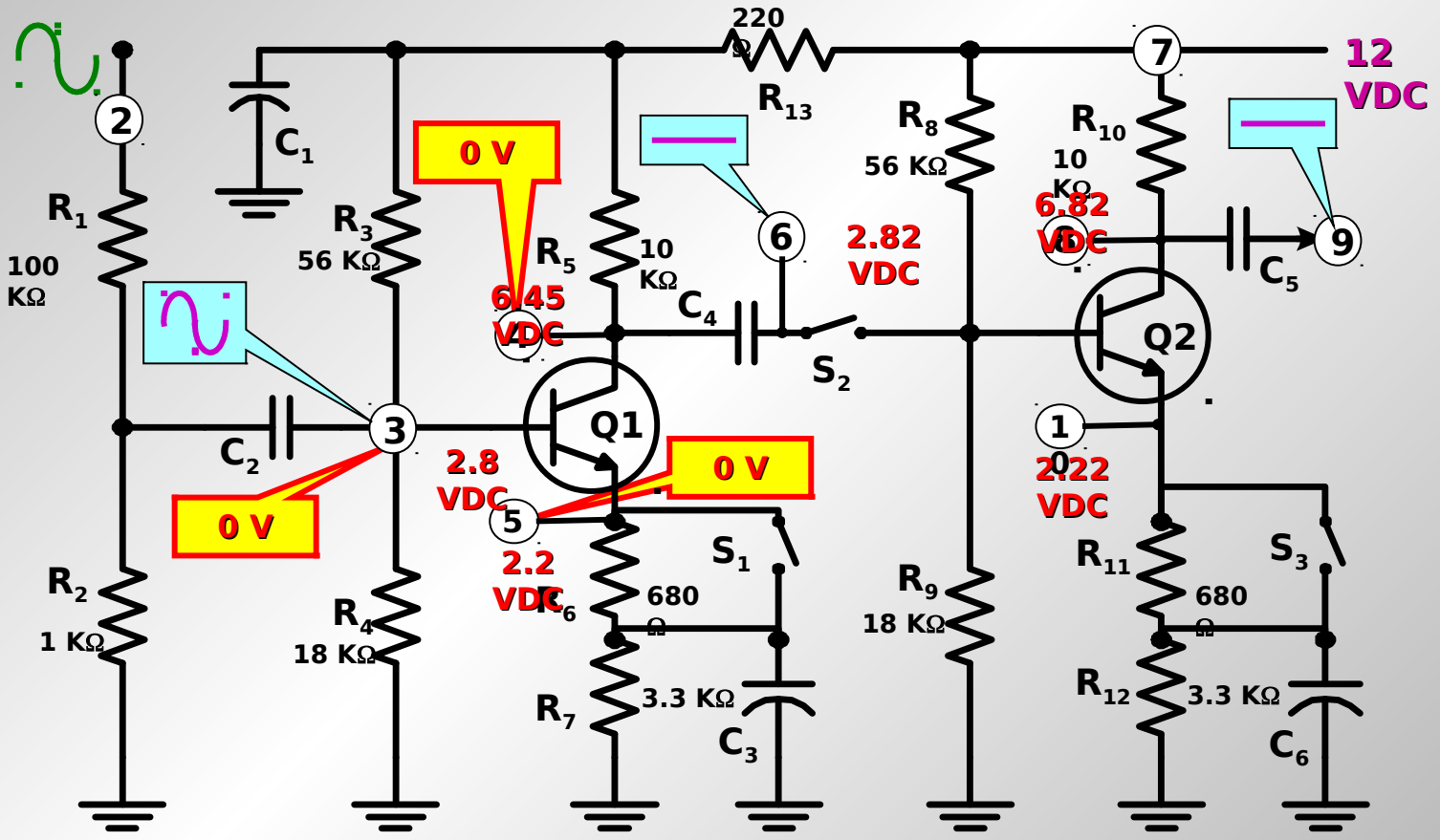
PC 130A-33; Troubleshooting, Challenge 7.



Review ?

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Review Questions;

1. What type of coupling is used on circuit card PC 33. _____
2. What are the three types of coupling discussed during this lesson. _____ , _____ , _____ .
3. What is the main purpose of coupling transistor amplifier? _____ _____
4. What coupling components make up the coupling network between Q1 & Q2? _____ & _____
5. What type of coupling is used for the most efficient method of impedance matching ? _____
6. What are the disadvantages of transformer coupling? _____
7. What type of coupling Has no time delay or Phase shift in the transfer of signals between stages of amplification. _____.

Answers 1-7

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Review Questions;

8. Refer to PC 33. There is no signal @ TP9. There is a good input & a signal @ TP6. Stage 2 voltages are: TP8 = 2.96, tp6 = 2.94, tp10 = 2.96, _____

9. What method of coupling has a wide frequency response [60Hz-200 KHz]? _____

10. If C3 opens what will be the gain of Q1? _____

11. High gain, economy of circuit components and small size can be achieved using what type of coupling? _____

12. What capacitors limit the low frequency response of the amplifier?

    a. Filter capacitor
    b. Coupling & Bypass caps
    c. Shunt capacitors
    d. Phantom Caps

Answers 8-12

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Review Questions;

13. Refer to PC 33. There is no signal @ TP9, a good signal @ TP3 & a no signal @ TP4. 1st stage DC voltages @ TP4 = 12v, TP3 = 0v & TP5 = 0v.

    A. R5 short
    c. R3 short
    B. R5 open
    d. R3 open

14. Refer to PC 33. There is no signal @ TP9, a good signal @ TP3 & a good signal @ TP4. DC voltages @ TP8 = 12v, TP6 = 0v & TP10 = 0v.

    A. R8 open
    c. R5 open
    B. R12 open
    d. C2 open

Answers 13-14

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Lesson Test;

Lesson Test:

Standard: 10 Questions W/in 20 Minutes. 70% Minimum Accuracy. Reference: PC 33. & White Gov Tng Aid.

PC 33

PE Write up

PE Set up

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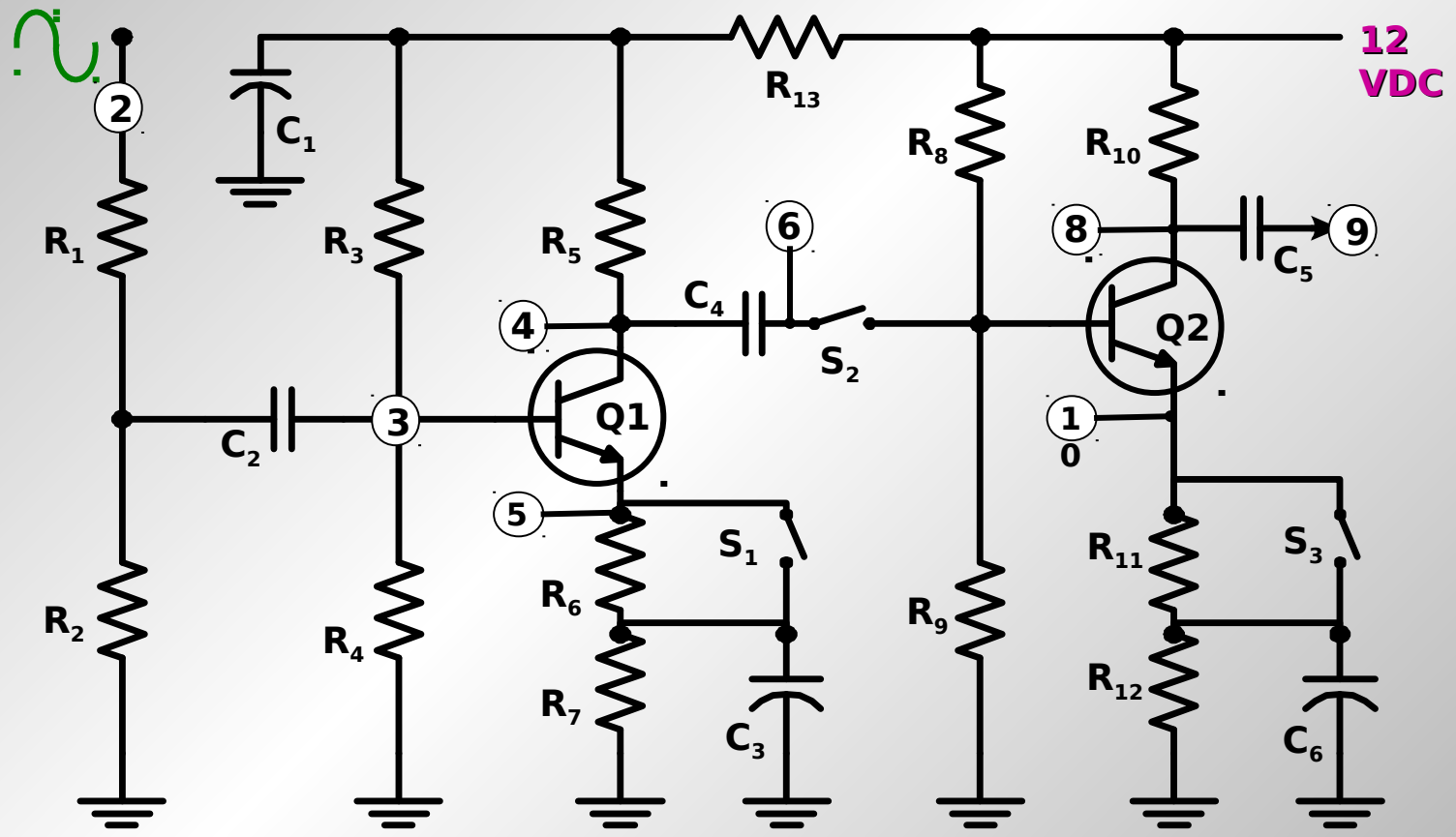
PC 33;



PE Write up